



# ***U.S. Geological Survey Streamgaging in Montana – Network Funding***

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***Prepared at the request of the  
Montana Streamgaging Oversight Work Group, August 12, 2020***

# Background

***Desired Outcome*** - Work Group understands:

- How the USGS network is funded
- How funding agreements work
- Annual costs of a streamgage and cost drivers
- Funding challenges

## ***Suggested Topics***

- USGS National Streamgage Network
- Funding Agreements
- Costs



# USGS Streamgaging Networks

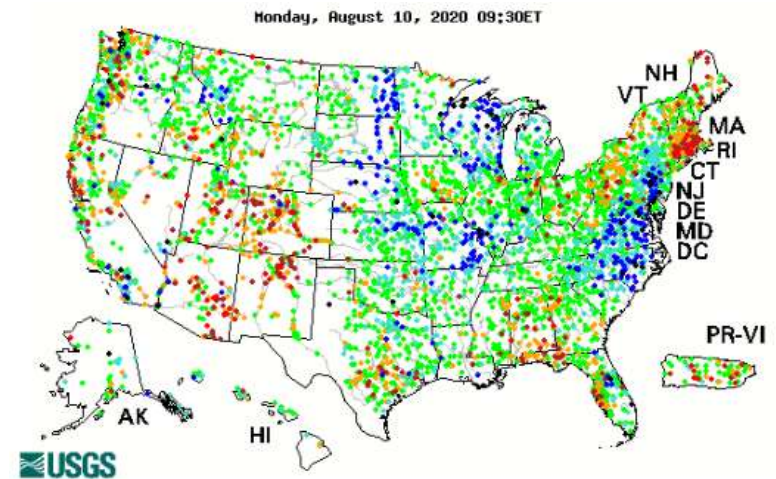
## "A Network of Networks"

### National Streamflow Network

- 8,200+ streamgages providing continuous streamflow
- Funding from ~1,400 Federal, State, local, and Tribal
- Multiple partner and USGS objectives
  - USGS [Cooperative Matching Funds](#) offset costs

### [Federal Priority Streamgages](#) Network

- Montana: 50 fully-funded; 3 partially-funded
- Funding from Congressional appropriation
- Designed to meet 5 Federal needs
  - Forecasting / Water-Quality / Compacts / Key Basins / Sentinel Watersheds



Eberts, S.M., Woodside, M.D., Landers, M.N., and Wagner, C.R., 2018, Monitoring the pulse of our Nation's rivers and streams—The U.S. Geological Survey streamgaging network: U.S. Geological Survey Fact Sheet 2018–3081, 2 p., <https://doi.org/10.3133/fs20183081>.



# USGS Streamgaging Funding *General*

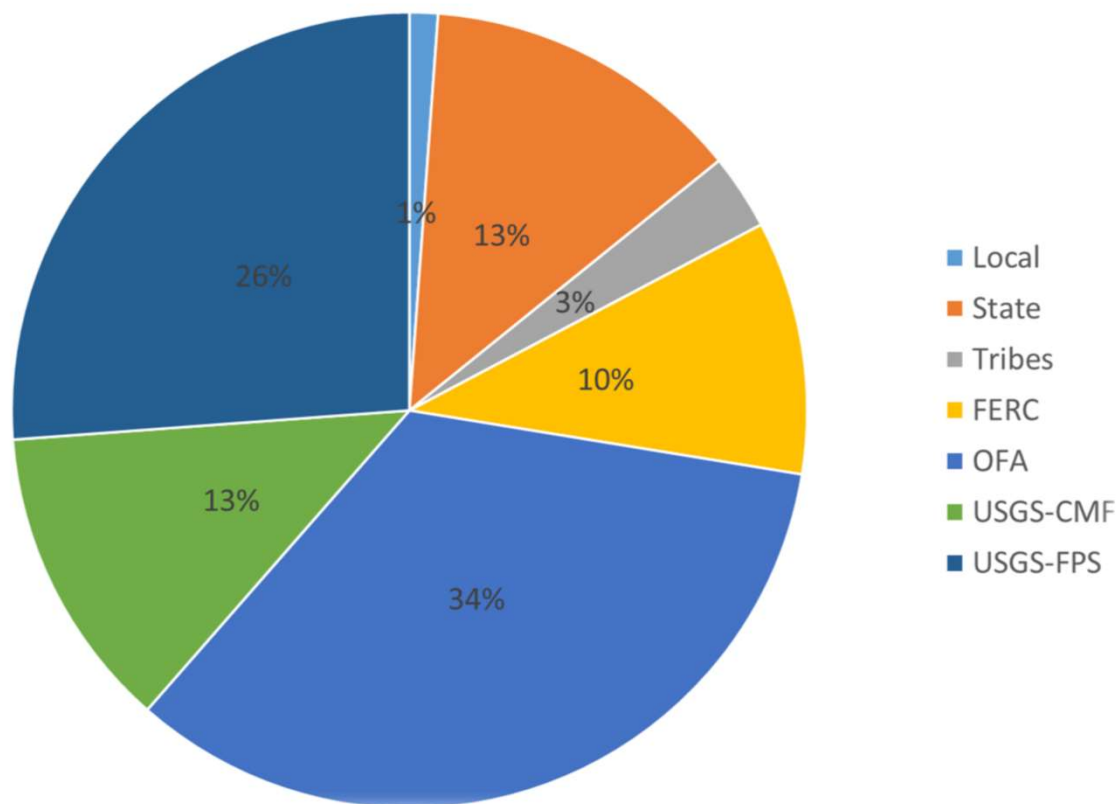
## Funding sources\*

- ~1/3 Local, State, Tribes, and FERC licensees
- ~1/3 Other Federal Agencies
- ~1/3 USGS
  - Cooperative Matching Funds
  - Federal Priority Streamgaging funds

\*WY-MT WSC



USGS Streamgaging Funding by Partner Type



# USGS Streamgaging Funding

## *Cooperative Matching Funds*

### Purpose of Cooperative Matching Funds

- Supports USGS data and studies to address partner needs
- Provides partial funding to offset total costs
- Ensures science is consistent and comparable

### Eligibility for Using

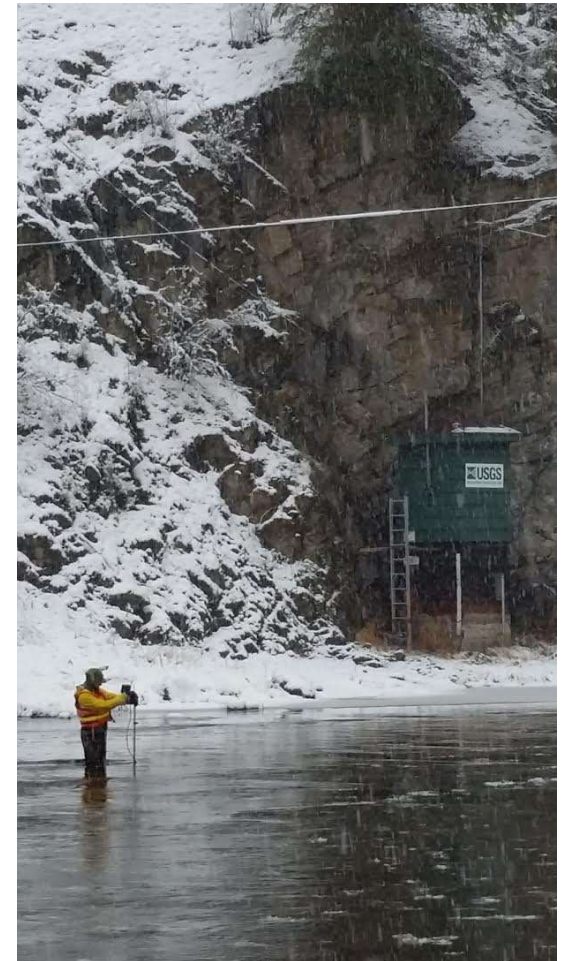
- Entities with taxing authority
- Match up to 50% of partner funds

### Competition for Funds

- Fixed allocation to Center
- Used by data and studies programs
- Results in match percentage less than 50%

### Joint Funding Agreements (JFA)

- 18 Montana partners with at least one JFA for streamgaging



# **USGS Streamgaging Funding**

## ***Joint Funding Agreements\****

### State Agencies

- Bureau of Mines and Geology
- Department of Environmental Quality
- Department of Natural Resources and Conservation
- Department of Transportation
- Wyoming State Engineer's Office

### Tribal Governments

- Blackfeet Nation
- Confederated Salish and Kootenai Tribes
- Fort Peck Assiniboiné & Sioux Tribes
- Northern Cheyenne Tribes

### Counties

- Granite County
- Lewis and Clark County

### Municipalities and Utilities

- City of Bozeman
- Big Sky Water and Sewer

### Districts

- East Bench Irrigation District
- Flathead Conservation District
- Madison Conservation District
- Petroleum County Conservation District
- Teton County Conservation District



\*Does not include all Wyoming partners



# USGS Streamgaging Funding

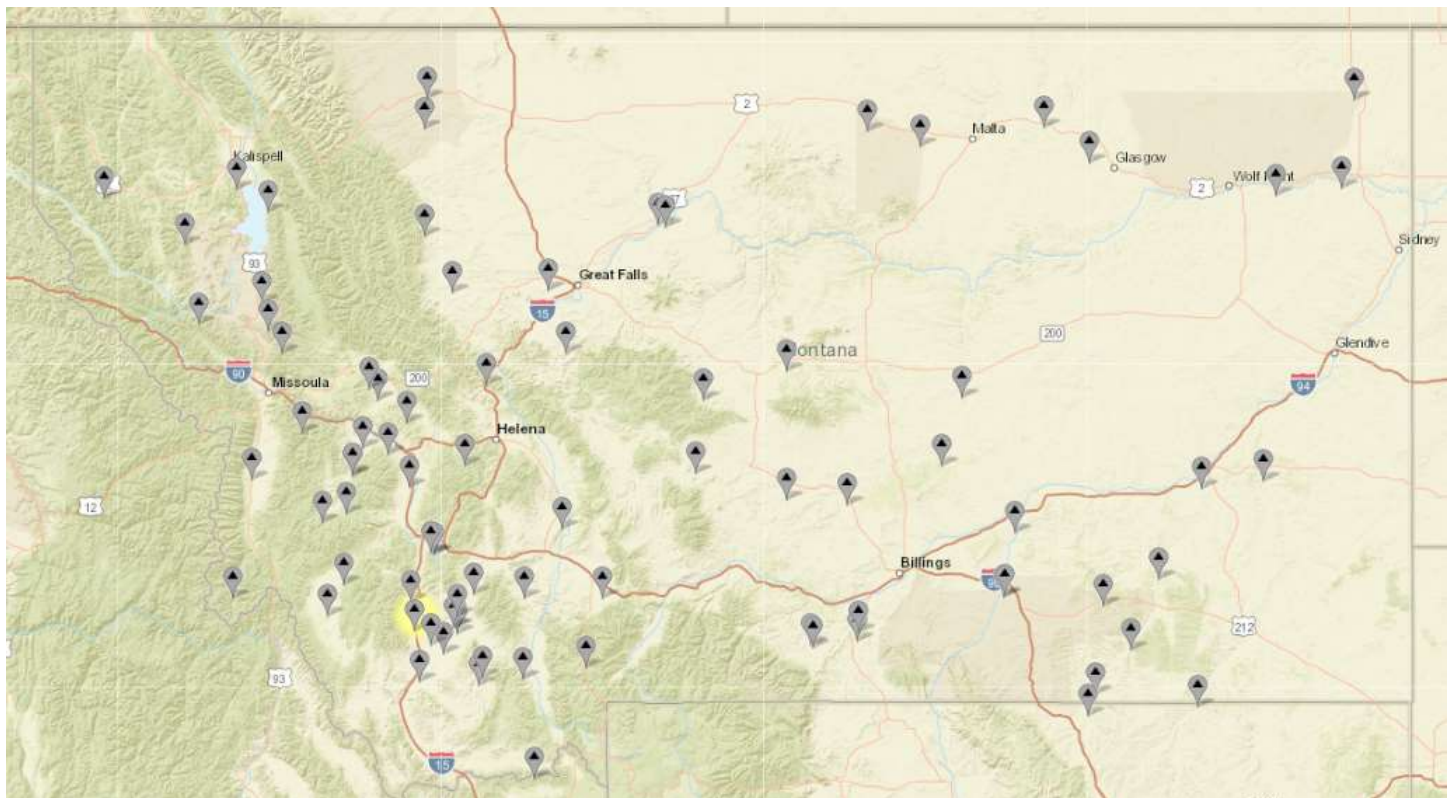
## *Joint Funding Agreements*

### Streamflow

- 82 total
- 54 year-round
- 28 seasonal

### Stage-only

- 1 seasonal



# USGS Streamgaging Funding

## *Other Streamgaging Partners\**

### Other Federal Agencies

- Bonneville Power Administration
- U.S. Army Corps of Engineers –  
Omaha; Seattle Districts
- U.S. Bureau of Reclamation –  
Great Plains; Pacific Northwest
- U.S. Department of State –  
International Joint Commission
- U.S. Fish and Wildlife Service
- U.S. Environmental Protection Agency
- Glacier National Park
- Yellowstone National Park

### FERC Licensees

- Avista Corporation
- Energy Keepers, Incorporated
- NorthWestern Energy

### Collaborative Agreements

- Big Hole Watershed Committee  
(water-temperature)
- Sibanye-Stillwater
- Talen Montana
- Tongue River Water Users Association

\*Does not include all Wyoming partners





# USGS Streamgaging Funding

## *Federal Priority Streamgages*

### Purpose

- Federally-funded streamgaging network addressing National priorities and responsibilities

### Criteria

- Streamgage meets one or more of 5 Federal needs
  - Forecasting / Water-Quality / Compacts / Key Basins / Sentinel Watersheds

### Montana – Status of FPS Network

- Eligible
  - 156 active, discontinued, and proposed
- FPS funded
  - 50 fully-funded
  - 3 partially-funded



# USGS Streamgaging Costs

## *Example Scope*

### Installation

- Site **reconnaissance** and selection; **acquisition** of instrumentation, equipment, and supplies; prefabrication and **bench testing**; **database** configuration; and construction and datum **establishment**
- Infrastructure typically consists of a weatherproof steel **enclosure** approximately 3-ft by 2-ft by 1-ft mounted on vertical timbers or posts; a galvanized-pipe **mast** for an antenna and solar panel; a pressure-transducer orifice assembly routed from the enclosure to the stream OR a bridge-mounted radar **stage-sensor**; and one (or more) 3-ft staff plate(s) **reference gage** OR a bridge-mounted wire-weight reference gage
- Other: Cableway or other means for measuring **non-wadable** streamflows



# USGS Streamgaging Costs

## *Example Scope (continued)*

### Operation and Maintenance

- **year-round**, continuous 15-minute gage-height and streamflow data
- 8 to 10 **discharge measurements** per year
- satellite **telemetry** providing current conditions every hour
- data, statistics, and other products **publicly-accessible**
- **quality assurance** measures including field validation of streamgage datum; analysis and approval of all measurements and records
- **database** maintenance; permanent archival of all data and data products
- **repair** and (or) replacement of equipment and instrumentation
- **National** support including technical specialists, periodic audits, and database enhancements
- Center **support** including management and administrative functions; facilities; and vehicles

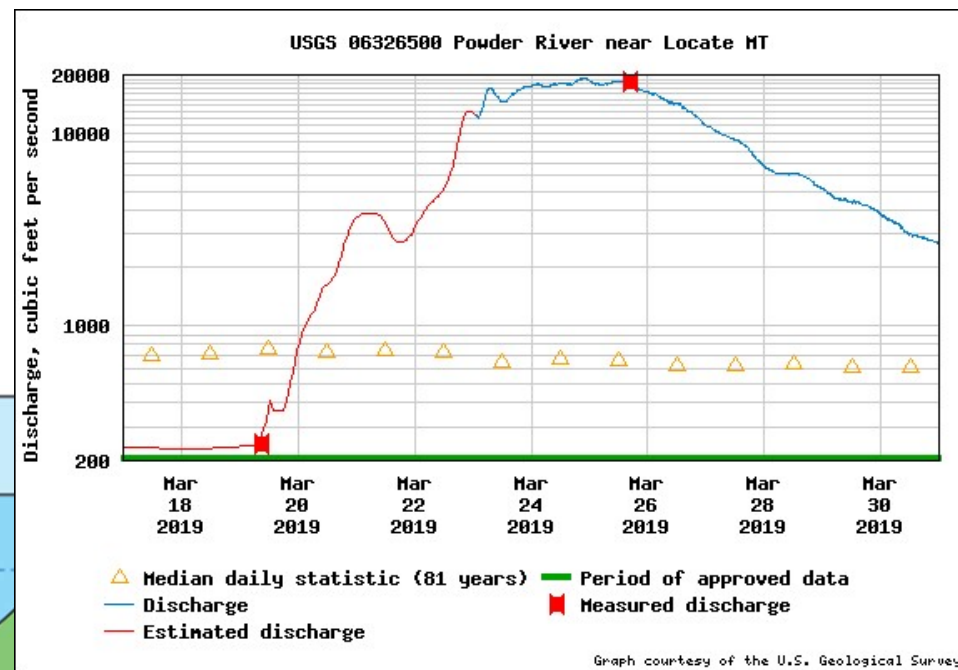
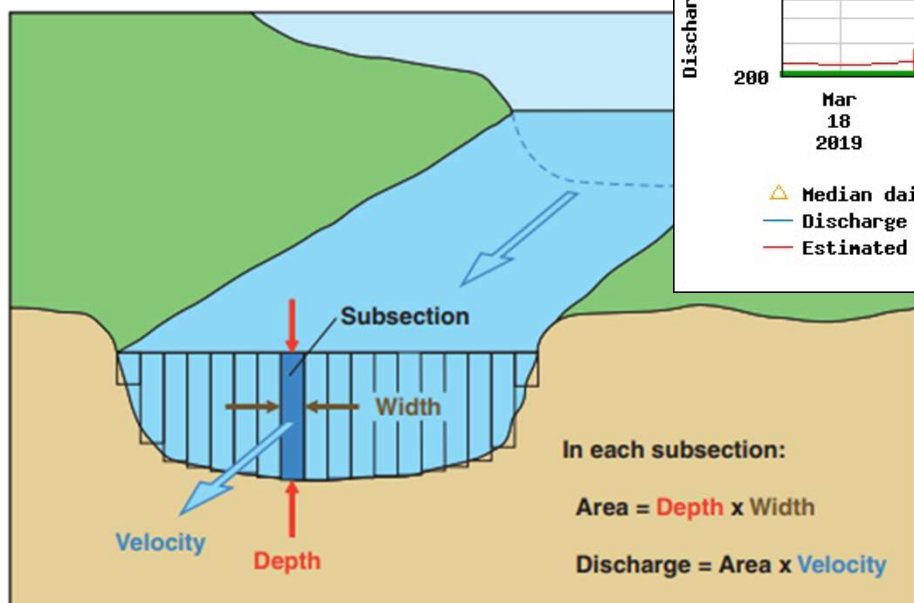


# USGS Streamgaging Costs

## Example Scope (continued)

### Objective

- Provide continuous discharge
  - Derived from stage and discrete discharge



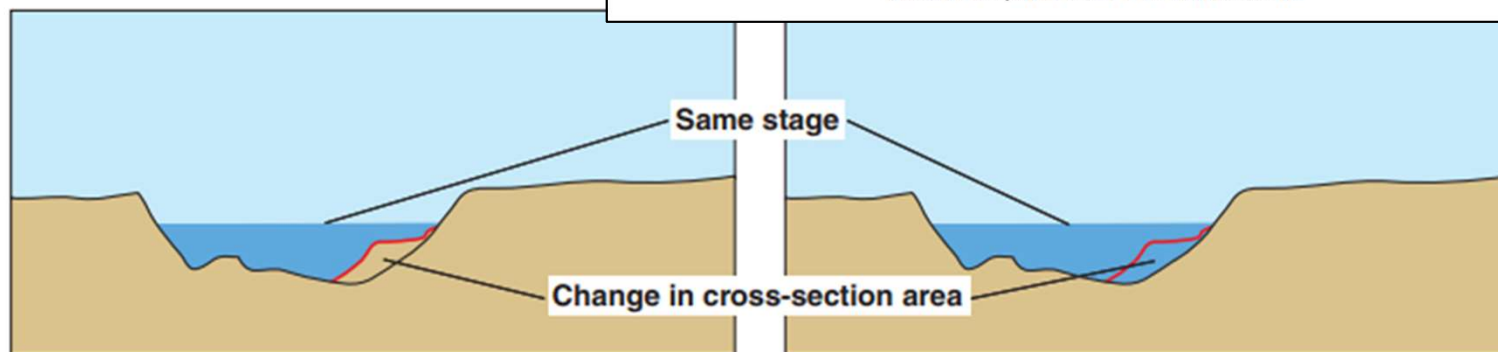
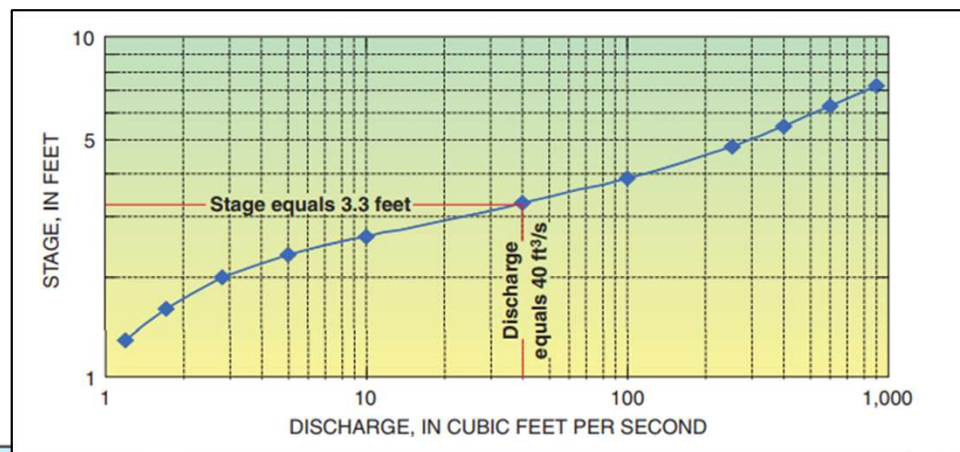


# USGS Streamgaging Costs

## Example Scope (continued)

Operation and Maintenance (continued) –  
*The Stage-Discharge Relation (i.e. Rating)*

- Site dependent
  - Function of controlling feature(s)
- Empirically derived
  - Discharge measurements
  - Range in observed stages
- Continual maintenance – Shifts



# USGS Streamgaging Costs

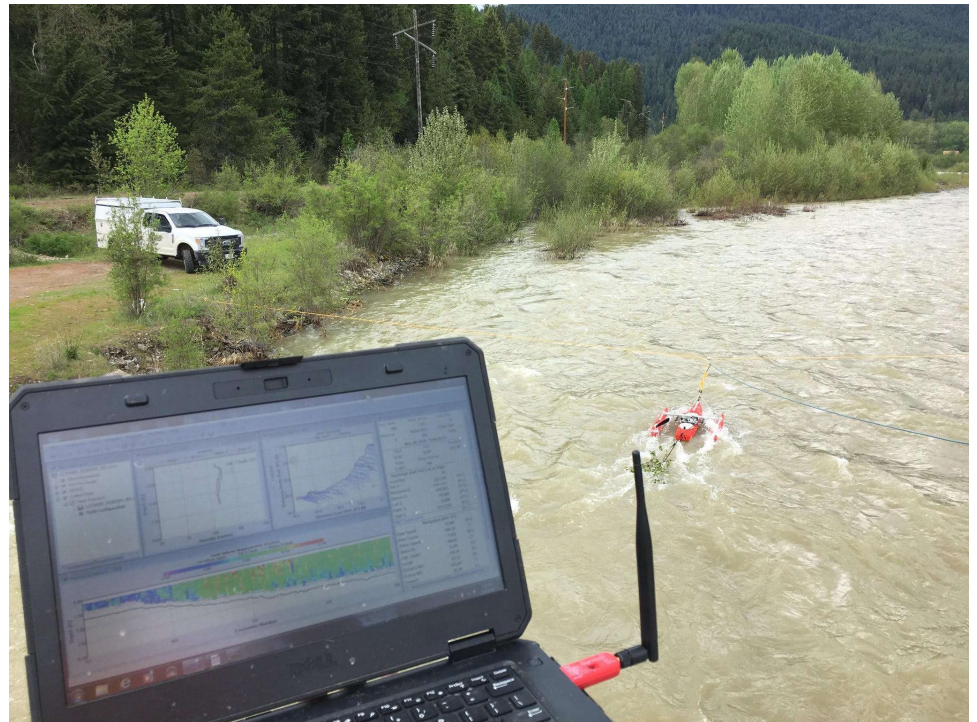
## *Example Costs*

### Total Costs

- Installation: Site dependent
  - ~\$ 7,800
- Operation and Maintenance (late FY20)
  - \$18,265 Year-round streamgaging
  - \$12,800 7-month streamgaging
  - Inclusion of USGS-CMF reduces total costs
    - Funds assessed prior to allocation
    - Proportional to USGS-CMF amount

### Cost Distributions (O&M)

- |                      |       |
|----------------------|-------|
| • Salary             | 43.6% |
| • Travel/Vehicles    | 9.0%  |
| • Equipment/Supplies | 7.8%  |
| • Support            | 39.6% |



# Wyoming-Montana Water Science Center

## *Resources*

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### ***Water Science Center Home Page***

<https://www.usgs.gov/centers/wy-mt-water/>

### ***Montana Current Conditions***

<https://waterdata.usgs.gov/mt/nwis/current/?type=flow>

### ***Other USGS Resources***

- USGS WaterWatch <https://waterwatch.usgs.gov/>
- USGS WaterNow  
<https://www.usgs.gov/mission-areas/water-resources/science/waternow>
- USGS WaterAlert  
<https://maps.waterdata.usgs.gov/mapper/wateralert/>





# Wyoming-Montana Water Science Center

## *Resources (continued)*

### Other USGS programs

- [Integrated Water Availability Assessments](#) (IWAA)
- [Next Generation Water Observing Systems](#) (NGWOS)

### Selected USGS streamgaging references

Kenney, T.A., 2010, Levels at gaging stations: U.S. Geological Survey Techniques and Methods 3-A19, 60 p., online at <https://pubs.usgs.gov/tm/tm3A19/>.

Mueller, D.S., 2016, QRev—Software for computation and quality assurance of acoustic Doppler current profiler moving-boat streamflow measurements—User's manual for version 2.8: U.S. Geological Survey Open-File Report 2016–1052, 50 p., online at <https://pubs.er.usgs.gov/publication/ofr20161052>.

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Sauer, V.B., and Turnipseed, D.P., 2010, Stage measurement at gaging stations: U.S. Geological Survey Techniques and Methods book 3, chap. A7, 45 p., online at <https://pubs.usgs.gov/tm/tm3-a7/>.

Turnipseed, D.P., and Sauer, V.B., 2010, Discharge measurements at gaging stations: U.S. Geological Survey Techniques and Methods book 3, chap. A8, 87 p., online at <https://pubs.usgs.gov/tm/tm3-a8/>.



# USGS Streamgaging Funding

## *Question and Answer*

Stakeholder submitted questions

